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DATA PROCESSING DIGEST

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Applications

RAPID RETRIEVAL OF INFORMATION

COMPUTERS AND AUTOMATION, October 1958; pages 8-20.

Computer prints out abstracts

An automatic information retrieval system, designed by General Electric's Aircraft Gas Turbine Division in Cincinnati, Ohio, is based on the use of descriptive key words and document file numbers. Each document may have a dozen or more words to describe it. All documents pertaining to the same subject are listed by number with these terms. A short descriptive abstract is prepared for each document. All the information about the documents is maintained on magnetic tape for use on the Division's computer. At present 7000 key words describe more than 30,000 document abstracts recorded on three tapes. More than 250,000 document file numbers are coordinated with the words in the system. A search through the entire list of numbers takes less than three minutes. The system prints out the abstracts of the desired documents, along with the name and company address of the requestor, the document's title, author, and file number, and the security classification of the material. Present capacity of the system is one million abstracts, 56 million file numbers, and 99 simultaneous searches.

Other descriptions of computer applications in this issue include mail sorting, character reading, construction design, banking, inventory, military and scientific applications. Several of these have been reported previously in DPD.

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COMPUTER "POOL" SERVES 7 ENGINEERING FIRMS

E. M. Chastain, Midwest Computer Service, Inc., Decatur, Ill.
AMERICAN BUSINESS, October 1958; pages 15-17.

Seven engineering firms located in or near Decatur, Illinois, have joined in establishing the Midwest Computer Service on a co-operative basis. In March and April, 1958, a Bendix G-15D was installed. Under the arrangement, the seven participating firms, which range in size from 40 to 120 employees, share stock in the enterprise, and share responsibility for administration through a board of directors elected by the member companies. Time remaining from the members' jobs is rented to other companies in the area.

DIVIDEND ACCOUNTING

Charles F. Pestal, Northwestern National Life Insurance Co.
BEST'S LIFE NEWS, October 1958; pages 37, 49.

Northwestern National Life selected the Univac File-Computer, Model I, and began conversion in March, 1958. The system is a complete consolidation of functions, with all records being maintained by the electronic system, and files updated on a daily cycle. The following functions are performed by the computer system: premium and loan interest billing; policy loan operations; commission calculation; cash value maintenance; processing of premium and loan interest payments; non-payment processing; automatic changes in policies; new issue data validation; accounting and record keeping in the above areas; dividend calculation. The last function represents a particularly efficient use of the computer's storage facilities. A description is given of the method by which the computer computes dividends from quinquennial values established by the actuarial department.

DISTRIBUTION CENTER IS FIRST OF TWELVE

CHAIN STORE AGE, October 1958; pages A22, A23.

Montgomery Ward's Allen Park, Michigan, warehouse and distribution center ((see DPD: November, 1958, page 14)) will provide for maintaining a running record of customer preferences, as indicated by orders. Merchandisers and buyers will thus have on tap almost instantaneously data on what customers want. Automatic inventory maintenance, issuance of picking orders, shipment checklists, charge register, back-order reports, and emergency level signals to buyers are features of the computer system.

650 RAMAC IN TRAFFIC CONTROL

COMPUTING NEWS, October 1, 1958; page 15.

The Civil Aeronautics Administration placed an IBM 650 in operation in September, to compute and print flight progress data, estimate flight check point and arrival times, and determine airspace conflicts. The system covers most of Indiana and Ohio, parts of Illinois, Kentucky, and West Virginia. Progress of flights through the area is shown by flight progress strips made for each radio fix that a plane passes through. Two IBM 838 inquiry stations connected with the computer may be used to request data, or report reroutings. Flight progress strips are printed by a 407 tabulator at the rate of 3000 per hour.

In processing a flight plan, the computer takes the appropriate airway table from memory and computes fix-to-fix distance. Using

the plane's estimated entry time into the control area, and applying the plane's speed and wind data, the computer calculates time over each navigational fix.

THE USE OF A RANDOM ACCESS MEMORY DEVICE (IBM 305) IN FIRE AND CASUALTY OPERATIONS

Bryson Clarke, Kansas City Fire & Marine Insurance Co.
THE INTERPRETER, October 1958; pages 3-6.

The author's company found that rental of the IBM 305 would be only $248.36 more a month than their present expense, based on the elimination of $2,051.64 in accounting and punch card machines and $900 in operator salaries. On this basis they justified acquisition of the system.

A description of the method by which file addresses are randomized is given, along with a brief resume of expected operations on the computer.

PENNSYLVANIA'S EDP CENTER

Pennsylvania is the first state to establish an electronic data processing center for all its departments and agencies. The center opened in October with a Univac system beginning work on the Health Department's payroll. It is expected that the system will be used on a three-shift basis in about a year. Payroll processing alone is expected to save the state $300,000 a year.

General Information

HOW SEVEN COMPANIES PREPARED THEIR EMPLOYEES FOR AUTOMATION

AMERICAN BUSINESS, October 1958; pages 28-31.

How employees responded to the computer

Here is a good comparison in chart form of seven companies' policies on informing employees about computer installations. The chart includes the following categories: personnel preparation, degree of opposition, effect on employee turnover, employee morale, counteracting gossip and rumor. Companies identified include, Metropolitan Life Insurance Co. ((See DPD: June, 1956, page 1, U.S. Department of Labor Study, which did not reveal name of the organization being studied at that time)), Passaic-Clifton National Bank & Trust Co., and Pacific Mutual Life Insurance Co.

Companies remaining nameless in the comparison include two textile companies, a clothing accessory manufacturer, and a retail clothing chain. In one of the textile companies and in the retail clothing chain, lack of personnel preparation resulted in serious difficulties in carrying out the computer transition, and in detrimental personnel morale.

Although the sample is a small one, it shows that companies with a good employee communication policy had successful employee response to the computer installation; and that those companies that didn't -- didn't.

AUTOMATION AND THE OFFICE—I

H. W. Gearing
THE COMPUTER BULLETIN, October-November 1958; pages 43-46.

In reviewing the slowness of British business in incorporating electronics in the office, the author gives the following reasons:

1. "The British equipment manufacturers, who have been eminent in the development of computers for mathematical work, have not produced adequate extensions of the equipment to cater for office work....

2. Some who ordered computers attracted much publicity before attempting any of the programming work for the major jobs. This repeats the American experience of 1954-56.

3. Senior management has found it difficult to appraise the economics of a computer installation or to revise existing

British office automation parallels U.S. in errors and inadequate planning

patterns of functional organization which cause the departmentalization of clerical work and duplication of records.

4. Some office principals have been unable to appreciate what a computer will not do, and may have been misled by over-simplified presentations into underestimating the work of preparation for a computer. This is perhaps less true here than in America.

5. Potential office users have failed to realize that they had something to gain from studying the experience of computers used in mathematical and statistical work....

6. Means have not been available to measure in greater detail the level or the movements of basic data, required as input to the system, if better management information is to be given out.

7. It has taken time to train staff in the new techniques, staff who know the organization from having lived with it for many years."

The points made above will be expanded by the author in a subsequent article.

WHY AMC WANTS INTEGRATED EDPE

Winton O. Etz, Air Materiel Command
ARMED FORCES MANAGEMENT, October 1958; pages 24-26.

World-wide computing system

In the planning stage for many months is the extensive world-wide automatic communications network designed for the Air Materiel Command. The final system will handle statistical, personnel, financial and other administrative data for commands including Military Air Transport Service, and Air Research and Development Command. The system is expected to be operational in two years. The ideas behind the logistics net can be adapted by other services or by any commercial enterprise with dispersed, multiple activities.

The system will use a common language for inter-center communication, but inputs and outputs can be in any language currently used or projected. These include the five, seven, and eight bit code. It will be possible to combine teletype, punched card, magnetic tape, and facsimile transmissions, and to send them over one physical circuit with little, if any, error.

There will be a relay switching center at each AMA Depot information processing center, with other auxiliary switching centers here and overseas. The system will include direct communications with prime contractors and with other agencies working with AMC.

ORGANIZATION FOR AUTOMATION

Lionel E. Griffith, International Latex Corp., Dover, Delaware
THE OFFICE, October 1958; pages 138-152, 266-269.

New concepts of data processing as a service to the entire business demand a new concept of business organization as well. The organization must be thought of "as a totality, and not as an expression of special areas" such as manufacturing, marketing, or accounting. Moreover, present organizational forms, following archaic military lines, do not allow for effective systems work, which is usually made a staff function with little or no authority. "To be effective [systems work] must penetrate practically all areas where action is facilitated or controlled by paperwork in volume."

Organizational charting in three dimensions

Machine data processing should be "the center of a series of systems which can allow for complete accounting, statistical, production, marketing and management control." Traditional charting methods are inadequate in this kind of organization. To show how such an organization should function, a three-dimension model is required. This is illustrated on the cover of the issue, and is diagramed in the article itself. This kind of an organization frees the professional man, such as the engineer, marketing man, and accountant, to pursue his professional work without the necessity of doing routine administrative work to maintain his department and insure a flow of usable data.

The organization suggested in the article would be one in which these conditions were satisfied:

1. All natural information flows would find their focal point in a data processing hub or core.

2. The intellectual areas of the enterprise would be separated out from the mechanistic areas. Thus, the manufacturing specialist would be concerned with manufacturing, the accountant with finance, and they would be serviced by a data processing system manned by paperwork and data processing specialists who would provide manufacturing and accounting with data as the output of a system or a series of systems.

Information flows to and from data processing core

3. Each information flow, and the input and output units organized to support it, would report to a flow director. The purpose of the flow would be to provide the processing hub with suitably screened data. Its second purpose would be to receive, from the processing hub, end data to check against controls, and to dispatch it to any of the special areas requiring the information.

4. Each input and output unit would be considered as part of the total systems web and would have no line responsibility to the special areas of finance, marketing, manufac-

turing and distribution. In present terminology, for example, accounts payable and accounts receivable would be considered as input-output units and would not be thought of as accounting units.

5. Basic files would be considered as part of the data processing hub, but mechanisms for up-dating them would be part of a given information flow.

Systems and procedures a line function

6. The systems and procedures operation, normally reporting to the treasurer or controller staffwise under existing concepts, would form part of the line operation which would include the total data processing operations and the operations research area. The directors of the information flows, the manager of the systems and procedures department, the manager of the operations research element, and the manager of the machine operations department would all report to a director of information services who, in turn, would report to a vice president of administration, or the equivalent.

7. The specialized areas of manufacturing, finance and sales would place demands on the data processing hub and the total information service through the vice president of administration.

8. Manufacturing, finance, sales, etc., would have the responsibility of determining what data they required to properly perform their functions. They would be required to spell out, well in advance of planned due dates, the expanding demands they might wish to make on the system. They would also be concerned with determining the adequacy of output data from the system and with utilizing this information to keep management advised on the special areas under their control.

9. Each specialized area (finance, manufacturing, etc.) would maintain a domestic staff under its direct control to maintain specialized records and to service the professional staff.

UNIVERSITY RESPONSES TO EDP

Gardner M. Jones, Michigan State University
ACCOUNTING REVIEW, October 1958; pages 645-649.

Universities have approached the application of computers, first in the research function, second in teaching, and last in the universities' commercial function. Many colleges and universities have so far made little attempt to establish programs, and some of the computer training programs which have been established seem

to some educators little more than vocational training. Financing a program and acquiring adequate personnel are two of the problems. Another is inadequacy of communication among the various departments on campus and between the university and industry. Nor is industry helpful in guiding universities on the approach in teaching. There are exponents of both the liberal, basic schooling, and the specific programing and computer training.

Industry help is needed

Professors and students alike need practical industry experience in using computers, a need industry could meet if willing to offer opportunities for work in their installations. Industry could also provide the case materials needed for practical study in university courses.

One of the most serious deterrents to expanding computer programs in universities is the cost of the equipment. Here is where the university can help itself by making a long-needed survey of its own data processing and management decision needs, and considering the purchase of electronic equipment for multiple purposes. "It is time that the universities turned some research attention toward their own housekeeping activities.... the registrar's function, plant operation, and the business office.... Operation of a college is an ideal laboratory for application of the whole area of management sciences. An increase in housekeeping efficiency and effectiveness could result from diversion to internal methods research of only a part of the research funds expended annually by universities on far less rewarding topics. Experimentation in the application of electronic equipment to business-office records and to registrar's records is only one of the potentially fruitful areas of applied research within the university organization. Some experimentation in the quasi-mathematical approaches to alternatives in such areas as inventory maintenance, personnel planning, course and facility planning, and building programs, is sorely needed. Faculty advocates of scientific management, searching for places to apply their knowledge, need not go far afield for their laboratory."

Universities' own data processing needs could furnish training ground

A joint usage of a computer installation, half-business, half-academic, would benefit the administration and the teaching functions, and would more likely justify the expense of a full scale EDP system.

WHY RESTRICT INTEGRATED DATA PROCESSING TO INTERNAL COMPANY ROUTINES?

A. G. Mackey, American Airlines, Inc., Tulsa, Oklahoma
OFFICE MANAGEMENT, October 1958; pages 32, 33, 96-99.

It is suggested that companies doing business with each other explore the possibilities of standardizing information being passed from one to the other with the view to obtaining the benefits of integrated data processing. As an example, a distribution warehouse could furnish dealers with tab cards instead of printed parts lists,

which could be used as order cards and processed by the warehouse on its equipment. In the same way, inter-company TWX messages could result in punched tapes which could be automatically processed at the receiving company. Packing slips and invoices are also documents which offer possibilities as inter-mural integrated data processing media.

Common language between companies

That cooperation to these ends is possible among companies is shown in the example of the nation's airlines and the air plane and engine manufacturers who have agreed on an industry specification for a purchase order administration system. The system works in this way: Manufacturers supply tab cards for all salable items to the airlines. These cards include identification data, price and lead time. The airlines use these cards to create a purchase order card, adding quantity and delivery requirements. The manufacturer uses a tabulated packing card in the shipment. The system provides for quotations, acknowledgments, supplements, expedites, returns and cancellations. All transactions occur on tabulating cards exchanged between the parties.

Aircraft industry leads the way

Of course, to obtain the advantages of inter-company IDP, there must be the desire to cooperate and compromise for the common good. Coding data rather than transmitting readable language might cause some objections. However, coded data can lead to additional summary information such as in the case of the aircraft industry system, in which a side benefit was the ability to classify and summarize orders by machine as a by-product of the purchase order cycle where previously they had been tabulated separately.

Legal obstacles to inter-company IDP need not be considered difficult, inasmuch as many present inter-company transactions now completed on paper forms can readily be converted to common language form without disturbing the basic nature of the contractual relationship between the parties. In any event, a contract or agreement may be made stipulating the terms and conditions applicable, and outlining the requirements of the common language system to be used. In the same manner, government requirements may be complied with where necessary. As for the controls demanded by auditors, any well-designed system should include controls, and proofing a function is usually better under a mechanized system than under a manual one.

ELECTRONIC COMPUTERS AND BUSINESS INDICATORS

Julius Shiskin, Bureau of the Census
Reprint from JOURNAL OF BUSINESS, October 1957.

This long and detailed report deals with the problem of separating more meaningful business trends from seasonal and irregular fluctuations. The problem is especially acute because, on a month-to-month basis, seasonal and irregular movements are usually much larger than changes in the underlying cyclical trend.

A research program being conducted by the National Bureau of Economic Research indicates that techniques usable in analyzing country-wide economic trends may be adapted to the individual business organization. Thus, business managements can be better and more promptly informed about current trends in their own firms' operations and related fields.

A description of the method is given, and an appendix reproduces the computational steps required to place the problem on the Univac. A sample of a Univac print-out is given.

PROCEEDINGS, THIRD ELECTRONIC BUSINESS SYSTEMS CONFERENCE

Western Division, N.M.A.A., November 1957. $3.00

The Proceedings of the 1957 Electronic Business Systems Conference of the National Machine Accountants Association Western Division have been published. ((See DPD: December 1957, page 16.)) The general tone of this conference was an honest appraisal of computer installations, and suggestions as to what the companies would do better if they were to start over. Not all the papers are included in the proceedings; some that are: descriptions of General Electric computing system at Hanford Atomic plants, IBM 305 system at Young's Market Co., inventory control at Ogden Air Materiel Area, Boeing Aircraft production control, public utility customer accounting, and others.

Two Datatron installations

An interesting comparison may be made of two of the papers, describing Datatron installations at General Petroleum and at Argonaut Underwriters, Inc. The former found difficulties in the areas of tape testing (particularly reliable calibrating of new tape), equipment maintenance, and programing. The paper included some controversial suggestions on this last subject--for example, Systems and Tabulating Analysis as the best source of business problem analyst-programers. In the insurance firm, mistakes were made in not maintaining a good computer staff, but allowing management to take good men for other jobs without comparable replacements. Poor communication of computer requirements sometimes led to procedures that would not fit into the program. Often debugging procedures were ignored until all else failed. This company has found a plus use for their maintenance engineers--that of devising new commands at the suggestion of the programers which may be added to the machine at no additional expense.

Copies of the proceedings may be ordered from: A. G. Pia, 1924 South Eleventh Street East, Salt Lake City, Utah.

Management Sciences

A WORKING MODEL OF THE FINANCIAL DYNAMICS OF A BUSINESS

Bernard Whitney and Marion S. Israel, Scientific Business Programs, Inc., Los Angeles
OPERATIONS RESEARCH, July-August 1958; pages 573-579.

Accounting systems in diagram form

For most business managers, the balance sheet and profit and loss statement do not furnish a vivid enough picture of the financial dynamics of a business to allow the making of sound analytical judgments. This article presents a method of portraying the business situation in a geometrical construction that combines three standard accounting presentations: The Balance Sheet, Operating Statement, and Application of Funds. When combined in the special chart form illustrated in the article, they represent quantitatively a) what has occurred in the recent past, b) the dynamics of the current situation, c) present trends, and d) the adjustments of assets and liabilities required to accomplish a given end. The chart depicts on a single sheet what would ordinarily require nine pages for a three-month period.

The difference sectors of the circle together represent a complete financial picture of the business: Accounts Receivable, Cash, Accounts Payable, Other Assets, and Proprietorship. The concentric rings depict the data for three consecutive months in the example given.

"Looking outward from the center of the model, on the lefthand or counterclockwise side of each sector representing a particular account in a given month is the addition to that account which occurred during that month."

Dynamic flow of funds is revealed

"As the circle is 'rotated' or examined from different viewpoints along its periphery, we see that the additions to Accounts Payable along the Payments radial are also the Cash outgo (at the right or clockwise side of the Cash sector). The collections, which as additions to the Cash account are shown at the left of this sector along the Collections radial are in turn the outgo for Accounts Receivable. Similarly, Sales, which are income for Accounts Receivable, are also the outgo for Proprietorship.

"In the Other Assets segment, a further breakdown is exemplified. The segment of the concentric circle representing this account for March has been subdivided into three parts: an outer portion for 'fixed asset adjustment,' one for 'inventory adjustment,' and another for very 'liquid assets.'"

"Because the quantities it portrays are derived from accounting statements that must balance and because of its construction, there are certain sequences within the model that must balance out or total

correctly.

Checks and balances easily seen

"These balancing sequences provide easy and automatic checks for the manager who is not thoroughly familiar with the traditional accounting statements expressed separately and usually on different sheets. Equally important, the form of the model emphasizes the necessary interrelations not only between the quantities themselves, but what they represent concerning the financial operations of the business."

Fast preparation for management

"This form of analytical report can be prepared in a few hours from the usual accounting journals or from a specially designed summary journal. This eliminates waiting for the posting of the general ledger and speeds up crucial financial information by days or even weeks. The model is easily revised...in contrast to the inflexible monthly schedule normally required for all practical purposes by traditional accounting methods.

"The model is also useful for planning purposes....the executive can project the situation for the forthcoming month in accordance with certain assumptions he wishes to make. Let us suppose he would like to double Sales again. From previous experience, he can estimate quite closely what his Accounts Payable and Accounts Receivable will be at this assumed Sales volume. Likewise, he can project probable Collections and Usage. With these data, Cash requirements are calculated readily and he may discover these are beyond his present means."

Equipment

MAGNETIC TAPE CARRIERS

Managers of computer installations who find that their magnetic tapes must be transported over long distances, (that is from building to building, or city to city) may now do so in safety with a new carrier on the market which protects the contents from magnetic fields caused by transformers or similar interference. The cases vary in size and capacity and have heavy carrying handles and trunk-type latches which may be locked with padlocks. For further information, write: Records Reserve Corporation, 751 Clay Road, Rochester 23, N. Y.

Comment

MECHANIZED INVENTORY CONTROL

It has been recognized in the EDP field for some time that inventory control would be one of the most fruitful areas of application to mechanize. Considerable talk has occurred and much has been written on the subject. Now some of the actual results are coming in, so this would be a good time for a status report.

What is "inventory control"?

First, however, we ought to define "inventory control" so as to get a better idea of what is being accomplished. We see inventory control consisting of three major levels:

A. The strategy of inventory management;

B. The tactics of ordering;

C. Record-keeping.

At the strategy level, management (usually top management) must see the inter-relationship between total dollar investment in inventory, the number of reorders issued per year, and the tolerated level of "out of stock" conditions. A (simplified) decision in this level would take the form: "We do not want our total investment in inventory to exceed one million dollars, we do not wish to issue more than 10,000 purchase orders per year, and we do not want an 'out of stock' condition to occur in more than one-half of one percent of the demands made on our inventory." Making this decision in any sort of sensible fashion can get fairly involved.[1]

At the tactics level, decisions must be made on how much to stock of each item, how many times a year it should be reordered, and what the reorder quantities should be. Most inventories break down into the familiar ABC pattern of high-medium-low dollar usage items, but different levels of control for these three types of items is frequently not being done. Much good operations research work--both theoretical and practical--has been done in this area.[2] These tactical decisions should fit within the frame work of the strategic decisions above.

Finally, at the record-keeping level, we encounter the clerical aspects of inventory control--keeping track of the amount on hand, on order, required, obligated, etc. for each item of inventory. With thousands of inventory items, and thousands of issues and receipts per week, the problem of keeping records up-to-date and accurate is a difficult one.

EDP inventory control is at the lowest level

Where are we on this ladder of inventory control levels, as far as EDP mechanization is concerned? Well, all the talk and papers notwithstanding, we are just barely into the lowest (record-keeping) level, according to the published results--with a few notable exceptions.

The usual mechanization program of today is concerned with using the computer to keep records up-to-date. Management is reluctant to trust the computer to make the reorder decision, on how much and when to reorder; that step, they say, will come later after more experience has been gained.

The first cautious step in record-keeping mechanization is to have the machine keep the records up-to-date, and to periodically print out the pertinent information on all items of inventory for review by the human order clerks.[3, 4] The clerks have to scan this long list of items and decide which one to reorder, and in what quantity.

Action Notice

A more ambitious step is to "trust" the EDP system (which mainly means trusting the analysts and programers) to be able to spot every and all items requiring attention, and not bother having the machine print out the status of all items.[5] This so-called "management by exception" principle appears to be receiving a lot more lip service than actual application, as yet.

Among supply people, there has been much interest in the use of random access memories for storing the inventory records--and the usual argument given is that inquiries can be answered quickly. So it is pleasant to note that one of the first inventory control applications of a RAM[6] apparently does not call for all records to be printed out periodically, but rather calls only for the output of the "action needed" items.

In both of the steps just discussed, it should be remembered that a human being still does the reordering. Perhaps he does it better, because more information may be supplied to him, but his decision rules are much the same as under the manual or punched card system.

Maybe it is just coincidence, but we have searched the literature in vain for claims of actual cost savings, or other dollar benefits, in the approaches just discussed.

Next step up – computer decides "when" and "how much"

A significant improvement in the inventory control system can be made when the computer takes on the functions of determining the "how much" and "when" of reordering. An interesting description of such a system in operation appeared in last month's DPD.[7] It is worth noting, however, that this firm selected the "C" (or low dollar usage) items for their initial efforts--the items where the reorder decisions are less complex and the risk to the firm is less. In this particular case, the "C" parts constituted 65% of the items, but only 15% of the annual expenditures. But now some significant dollar savings begin to make their appearance. Savings of about $100,000 per year in the cost of writing purchase orders alone are claimed, plus $10,000 savings per year in operating costs. Inventory investment is expected to go down (with a theoretical saving of 50% in inventory investment costs), but the usual initial surge occurred when all low stock items were brought up to the specified

safety levels. This system did not require the use of a large random access memory.

Ideal: better strategy for management

But the big savings probably lie in the area of better strategy for inventory management. One way computers can be used here is to simulate the inventory situation for a firm, and explore the effect of various strategies. Stanford Research Institute has reported some interesting work in this area which they performed for the Southern Pacific Railway several years ago.[8] But this is not a one-time affair. We see an eventual inventory control system that, in addition to record keeping and reorder decisions, periodically reviews the strategic decisions and establishes new decision parameters, as required.

According to the literature, though, we're a long way from that point.

References:

1. "Decision Rules for...Inventory...", DPD, May, 1958, p. 11.
2. "Scientific Inventory Control," DPD, July, 1957, p. 4.
3. "7 Weeks Later...", DPD, October, 1958, p. 9, 10.
4. "A Case Study in Commercial Electronic Data Processing," DPD, October, 1958, p. 11-13.
5. "EDP--Production Control Application," DPD, July, 1958, p. 7.
6. "Small Company--Big Computer," DPD, July, 1958, p. 8.
7. "Electronic Brain Manages Sperry Inventory," DPD, November, 1958, p. 14.
8. "Inventory Control Problems," DPD, January, 1956, p. 15.

Training

Seminar--Application of Operations Research Techniques to Inventory Control; sponsored by American Management Association

Date: January 14-16, 1959
Place: New York City (Hotel Astor)
Fee: AMA Members: $150 Nonmembers: $175
Information: American Management Association, 1515 Broadway, New York 36, N. Y.

Orientation Seminar--Application of EDP Techniques to General Accounting; sponsored by American Management Association

Date: January 12-14, 1959
Place: New York City (Hotel Astor)
Fee: AMA Members: $150 Nonmembers: $175
Information: Same as above

Workshop Seminar--Analyzing Operations for the Application of Electronics; sponsored by American Management Association

Date: January 19-21, 1959
Place: New York City (Hotel Astor)
Fee: AMA Members: $125 Nonmembers: $150
Information: Same as above

Operations Research--short course

Date: January 19-30, 1959
Place: Case Institute of Technology, Cleveland, Ohio
Prerequisites: Research experience and sufficient knowledge of mathematics to understand mathematical symbolism.
Fee: $375, including 10 luncheons, six dinners, texts and supplies
Information: Dr. E. Leonard Arnoff, Asst. Director, O.R. Group, Case Institute of Technology, 10900 Euclid Avenue, Cleveland 6, Ohio

Engineering and Management Course

Date: January 26 - February 5, 1959
Place: University of California at Los Angeles
Information: R. R. Cole, College of Engineering, Room 3104 University of California, Los Angeles 24, California

Meetings

Eleventh Annual Industrial Engineering Institute, sponsored by University of California

Date: February 6, 7, 1959.
Place: Simultaneous sessions at Berkeley campus and Los Angeles campus
Fee: $30, including two luncheons and copy of printed Proceedings of the Institute
Information: Department of Conferences, University Extension, University of California, Berkeley 4, California; or Engineering Extension, University of California, Los Angeles 24, California

American Management Association 5th Annual Electronics Conference and Exhibit

Date: March 2-4, 1959
Place: New York City (Statler-Hilton Hotel)
Information: Roderick W. Smith, Assistant Manager, Finance Division, AMA, 1515 Broadway, New York 36, New York

Western Joint Computer Conference

Date: March 3-5, 1959
Place: San Francisco, California (Fairmont Hotel)
Theme: "New Horizons with Computer Technology"
Information: WJCC, Box 381, Station A, Palo Alto, California

Life Office Management Association Automation Forum

Date: April 13-15, 1959
Place: Chicago, Ill.
Information: Logan J. Massee, Massachusetts Mutual Life Insurance Company, Springfield, Mass.

ORSA National Meeting

Date: May 14, 15, 1959
Place: Washington, D. C. (Shoreham Hotel)
Information: Operations Research Society of America, Mt. Royal & Guilford Ave., Baltimore 2, Md.

International Conference on Information Processing

Date: June 15-20, 1959
Place: Paris, France
Information: U.S. Committee for the First International Conference on Information Processing, Box 4999, Washington 8, D.C.

British Computer Society First Annual Conference

Date: June 22-25, 1959
Place: Cambridge, England
Information: British Computer Society, Finsbury Court, Finsbury Pavement, London EC 2, England

NMAA National Conference

Date: June 24-26, 1959
Place: St. Louis, Missouri (Chase-Park Plaza Hotels)
Information: National Machine Accountants Association, 208 South Main Street, Paris, Illinois

1959 ACM National Conference

Date: Summer, 1959
Place: M.I.T.
Information: F. Verzuh, Massachusetts Institute of Technology, Cambridge, Mass.

SHARED PROGRAMING GROUPS

USE--December 10-12, 1958, at El Paso, Texas
April 1-3, 1959, at Chicago, Illinois

SHARE XII--February 17-20, 1959, at New York (Statler Hotel)
SHARE XIII--August 18-21, 1959, at Seattle, Washington (Olympic Hotel)

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The publishers of books and periodicals mentioned in this issue of DATA PROCESSING DIGEST are listed below for your convenience in writing for more complete information.

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